

Bi-Scale Radiance Transfer

Abstract

Computer graphics image rendering techniques render images modeling transfer
5 at two scales. A macro-scale is coarsely sampled over an object's surface, providing
global effects like shadows and interreflections cast from an arm onto a body. A meso-
scale is finely sampled over a small patch to provide local texture. Low-order spherical
harmonics represent low-frequency lighting dependence for both scales. To render, a
coefficient vector representing distant source lighting is first transformed at the macro-
10 scale by a matrix at each vertex of a coarse mesh, resulting in vectors representing a
spatially-varying hemisphere of lighting incident to the meso-scale. A radiance transfer
texture specifies the meso-scale response to each lighting basis component, and a
function of a spatial index and a view direction. A dot product of the macro-scale result
vector with the vector looked up from the radiance transfer texture performs the correct
15 shading integral. An id map places radiance transfer texture samples from a small patch
over the object's surface, so that only two scalars are specified at high spatial resolution.